The Rufford Maurice Laing Foundation

DAPHNE'04

An initiation of conservation action for two endangered plant species of Ukrainian chalk outcrops

FINAL REPORT

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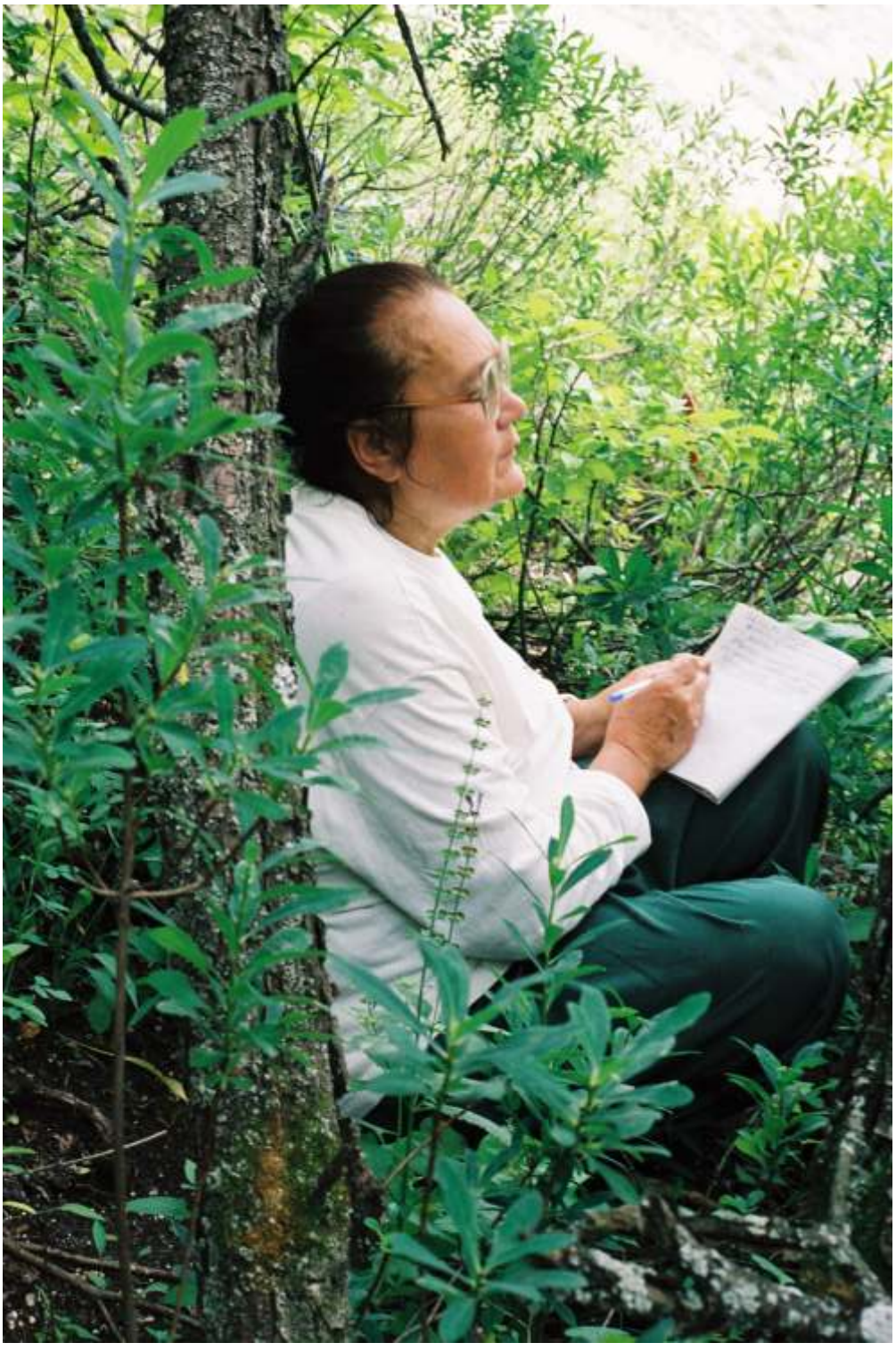
In memoriam

Vera Vladimirovna Tveretinova

(19th July, 1939 - 7th September, 2005)
Enthusiastic botanist and keen researcher,
who devoted her life to exploration of fascinating nature of chalk steppe,
who opened her heart for all us, followers and children…



SUMMARY

The project Daphne'04 was focused on field searches of remaining populations of endangered plant species, *Daphne sophia (Thymelaeaceae, Thymelaeales)* and *Hedysarum ucrainicum (Leguminosae, Fabales)*, in Ukraine, as well as on initiation of conservation action for these species through organising an educational campaign in local schools. Both species are endemics of Seversky Donets river basin and components of unique plant communities of chalk outcrops. 4 populations of *Daphne sophia* were found and assessed by vitality, 2 of which were discovered for the first time. The whole range of *Hedysarum ucrainicum* in Ukraine was carefully mapped along with population vitality estimates at several sites. Possible factors of threat for both species were identified.

Lectures and excursions for children in local schools were organised aimed at building well-rooted ground for the future conservation measures. Local schools were supplied by visual aids devoted to focus species & chalk plant communities in general and developed on the base of expedition findings. Project results were widely disseminated in form of information sheets to attract the attention of international and regional conservationists and general public.

Introduction and project objectives

The origin of the Daphne'04 project idea rooted in the results of CHAGRA'2000 project (financed by BP Conservation Programme) which show real levels of rarity of endemic chalk plant species in Ukraine. So, when much effort in plant conservation work is now devoted to exotic tropical or endemic island species, some others are balanced on the brink of extinction just in Europe, not far from the main centres of conservation policies. Many chalk plant endemics of Eastern Ukraine and adjacent territories of Russian Federation, e.g. *Daphne sophia* and *Hedysarum ucrainicum*, obviously fall into such category. The both are components of unique plant communities of chalk outcrops.

Daphne sophia was formerly one of the typical species of edges of natural forests on chalk lands including pine forests formed by chalk ecotype of Scotch pine. The decline of the species was caused by drastic collapse of pine forests as a result of clear-cuttings. The range of *Daphne sophia* was severely fragmented. In early 1900s 14 sites were known where small populations still remained (Taliev, 1911; Klokov, Kotov, 1927). In second half of XX century the species disappeared in 8 (or 57%) of these sites (Smolko, 1967). To the start date of the project the state of *Daphne sophia* in Ukraine was completely unknown as the last inventory was made in late 1970s.

Hedysarum ucrainicum is an endemic species of Aydar river basin with rather restricted range. About 10 local populations of the species were known in last century. One site was rediscovered within CHAGRA'2000 project activities in Novopskov district, Lugansk region.

The project aim to initiate conservation actions for *Daphne sophia* and *Hedysarum ucrainicum*, both very vulnerable plant species endemics of chalk outcrops in Eastern Ukraine.

The project objectives are the following:

to locate and map populations of *Daphne sophia* and *Hedysarum ucrainicum* in Ukraine, to assess their vitality and possible factors of threat;

to organise an educational campaign in local schools for teachers of biology and children (lectures, excursions, installation of information boards);

to set the priorities for the conservation of both focus species;

to disseminate project results in a form of concise information sheets.

The project was run in May, 2004 being supported through Rufford Small Grants Scheme.

Project team

The project team consisted of seven members:

Mikhail Banik, Daphne'04 project leader, researcher at Laboratory of Forest Management, Ukrainian Research Institute of Forestry and Forest Melioration, experienced in research and conservation of rare plant & bird species of chalk steppe ecosystems in North-eastern Ukraine

Tatiana Atemasova, lecturer at Chair of Zoology and Animal Ecology, Biology Faculty, Kharkiv national university, conservationist, involved in conservation activities since late 1980s, actively promotes the issues of protection of chalk steppe ecosystems through creation of conservation areas

Andrey Atemasov, senior researcher at the Laboratory of Applied Problems of Animal Ecology, Institute of Biology, Kharkiv national university, ornithologist, conservationist, highly experienced in GPS use and computer work

Eugeny Skorobogatov, researcher at the Laboratory of Applied Problems of Animal Ecology, Institute of Biology, Kharkiv national university, highly experienced field conservationist and photographer

Ruslana Volkova, lecturer in botany & nature protection at Botany chair, Natural History faculty, Kharkiv pedagogical university, botanist, has significant experience in studies of chalk plant communities and in environmental education

Dr. Vera V. Tveretinova, Ph.D (botany), botanist at Botany chair, Natural History faculty, Kharkiv pedagogical university, specialist in systematic botany, great experience in studies of chalk plant communities, was involved in the last inventory of *Daphne sophia* in Ukraine in late 1970s

Ivan Mironenko, teacher of biology in Volchanskie Khutora village, Volchansk district, Kharkiv region (within the range of *Daphne sophia*), enthusiastic conservationist, highly experienced in training groups of young naturalists, participated in creation of local conservation areas

Fieldwork methods

Searches for plant species populations

The project expeditions were planned in so manner to survey all the parts of the range of both species in Ukraine (Appendix A). Searches of *Daphne sophia* populations were performed in May-August, 2004 in Kharkiv and Lugansk regions. 4 sites supporting small populations of *Daphne sophia* were historically known in Ukraine. All the sites were confined to Volchaya river valley in north-eastern part of Kharkiv region. Renowned Russian botanist V. Taliev discovered two sites in 1910 (Taliev, 1911). Two others were found in 1960s and 1970s by Kyiv and Kharkiv botanists (Smolko, 1967; Ermolenko et al., 1981). At first, we surveyed carefully these 4 sites trying to take into account all information available from literature (relief position, the type of vegetation cover, dominant or distinctive plant species and so on) and local people. Two of four sites were re-discovered by our team in first expedition. Afterwards we have searched all suitable habitats along elevated right banks within 5 river valleys in Kharkiv region (Volchaya, Plotva, Kozinka, Verchnyaya Dvurechnaya and Oskol rivers) and 3 river valleys in Lugansk region (Loznaya, Aydar and Belaya rivers). Each river valley was divided into several plots. Each plot was searched by

foot by part of a team (2-4 people) using already gained knowledge about typical habitat structure (mainly, relief conditions) at those sites where *Daphne sophia* was re-discovered. The use of the method was highly successful and resulted in discovering two previously unknown sites with small *Daphne sophia* populations.

Unlike *Daphne sophia Hedysarum ucrainicum* dominates in plant communities at those sites where it grows. No special methods are needed for searches of the species in the time of blossoming. The searches were performed within above-mentioned three river valleys in Lugansk region.

For each site the co-ordinates of the centre, altitude, boundaries of the area occupied by *Daphne sophia* and the size of the area were identified using GPS GARMIN-12. For *Hedysarum ucrainicum* we were able to delineate and map the boundaries of smaller areas occupied by separate populations or to map the outer points of continuous distribution area in Belaya river valley. As a result, we have mapped the whole range of the species in Ukraine for the first time.

Fieldwork methods (continuation)

Population vitality studies

Each population was studied to estimate the overall vitality and factors of threat. As the area occupied by every found population of *Daphne sophia* is rather small, we were able to establish only one sample plot for each population. Within each site a centre for sample plot was chosen randomly. The design of sample plots is similar to that one used for U.S. Forest Health Monitoring (Tallent-Halsell, 1994). One sample plot contains four quadrate subplots of 1 m2 area arranged in an equilateral triangle with an additional subplot at the centre of the triangle. The centres of the outer subplots are 5 meters from the centre of the central subplot. The only exception was the design of sample plot near Vtoroye Zhovtnevoye village (newly found location) where *Daphne sophia* grows in linear strip along oak forest edge on slope (here the sample quadrates were arranged linearly in regular order). The triangular design was used for the assessment of the vitality of *Hedysarum ucrainicum* populations as well.

The density of focus species and general vegetation cover was estimated within each quadrate. The following parameters were identified for every individual of *Daphne sophia*: origin (certainly clonal or indeterminate), overall height, diameter at root collar, the length of current-year shoot, secondary branching (yes or no), signs of flowering (if any), the ratio of flower-bearing to non-flower-bearing shoots, the number of inflorescences per each flower-bearing shoot, the number of flowers per each inflorescence, damage signs (if any). The total of 228 individuals of *Daphne sophia* was measured on 4 sample plots. The vigour of each individual was estimated in three-point scale. The estimates were based on the size parameters and on production ability. Individual vigour estimates were used to calculate overall mean vitality of separate population.

The following parameters were identified for every individual of *Hedysarum ucrainicum*: the overall height, the number of flower-bearing shoots per individual, the number of inflorescences per individual, the maximum height of inflorescence, damage signs (if any). The total of 871 individuals of *Hedysarum ucrainicum* was measured on 7 sample plots. The vigour of every individual was assessed in three-point scale to obtain mean population vitality estimates.

For each site we have identified the type of land use of nearby territories (e.g. forest management in natural forests, management of forest plantations, grazing). The possible impact of the factors of human disturbance was assessed for each population.

Scientific results of the project

Current status of Daphne sophia and Hedysarum ucrainicum in Ukraine

4 sites with *Daphne sophia* populations were known in Volchaya river valley in Kharkiv region in XX century. We have failed to find *Daphne sophia* at two sites: between Okhrimivka and Chaikovka villages (V.I. Taliev site of 1910 year) and near Bochkovo village (S.S. Smolko site of 1965 year). Both sites were completely transformed due to terracing and afforestation of chalk slopes. Two sites were rediscovered since 1910 year (V.I. Taliev site near Malaya Volchaya village) and since 1978 year (Gorelova-Tveretinova site near old Okhrimivka forest enterprise office). Thorough searches resulted also in discovering two new sites. One site was found in Volchaya river valley (near Vtoroye Zhovtnevoye village). The second was discovered far outside Volchaya river valley in Verchnyaya Dvurechnaya river valley for the first time for Ukraine. All populations are well isolated with minimum distance being about 6 km. Each population occupies small territory generally much less than 1 ha. Some of them (Malaya Volchaya, Verchnyaya Dvurechnaya) consist of two or three completely separated sub-populations (see Table 1). We delineate and map these territories using GPS technique for the first time. The map with *Daphne sophia* sites location is given in Appendix B. The data on all surveyed *Daphne sophia* sites are presented in Table 1.

Daphne sophia obviously prefers chalk slopes with high height gradient and distinct profile type. The slopes are usually steep and are known as “walls” in local people. The species was found exclusively at the edges of remained natural forest fragments in upper and mid parts of the slopes.

Intensive searches were performed also to survey populations of *Hedysarum*

ucrainicum, the species with restricted range confined to Aydar river basin only. One well-isolated site with *Hedysarum ucrainicum* population was known from CHAGRA'2000 project investigations in Aydar river valley near Sharovka village (49°49'56,4'' N, 38°53'49,1'' E; altitude 120-140 m). It was surveyed and mapped by Daphne'04 project team. The site area is situated on slopes and saddles of Kreydyanaya “mountain” (9 ha). The rest of the species range in Ukraine is along elevated right banks of Belaya river valley. Here *Hedysraum ucrainicum* covers considerable areas that results in almost continuous distribution. Major populations were found:

- near Pavlenkovo village (49°43'00'' N, 39°05'20'' E; altitude 80-100 m; area 4,5 ha),
- near Trembachovo village (49°44'48,7'' N, 39°07'10,3'' E; 100 m; less than 1 ha),
- between Trembachovo and Novo-Belaya villages (49°44'48,7'' N, 39°08'21,5'' E; 90-120 m; about 10 ha),
- near Novo-Belaya village -1 (49°45'54,4'' N, 39°09'19,0'' E; 100-140 m; 25 ha),

Scientific results of the project (continuation)

- near Novo-Belaya village-2 (49°47'02,5'' N, 39°09'30,0'' E; 120-150 m; 7,5 ha),
- near Novo-Belaya village-3 (between 49°46'55,0'' N, 39°10'55,4'' E and 49°48'07'' N, 39°12'20'' E points; 80-140 m; no less than 40 ha).

The distribution is shown on the map in Appendix C.

Everywhere the species was found it plays a dominant role in vegetation cover of chalk slopes. *Hedysarum ucrainicum* prefers gentle slopes and especially saddles in upper parts of chalk hills.

Table 1. Daphne sophia sites in Kharkiv region according to Daphne'04 project findings

№	Nearest settlement	River valley	Geographic co-ordinates of site centre	Altitude	Site area, m2	Habitat	Distance to the nearest Daphne sophia site, km
1	Okhrimivka	Volchaya	50°20'24,7'' N 37°09'39,2'' E	155	160	Natural oak forest edge, upper slope	6.2
2	Malaya Volchaya	Volchaya	50°21'31,7''N 37°14'50,5'' E	140	~ 770 (~ 600 + 25 + 145)	Bush thickets, upper to mid slope	10.2
3	Vtoroye Zhovtnevo	Volchaya	50°23'52,0''N 37°22'49,7'' E	150	400	Natural oak forest edge, mid slope	10.2
4	Kolodeznoye	Verchnyaya Dvurechnaya	50°01'04,8'' N 37°39'32,0'' E	130	~ 1250 (1050 + 200)	Natural broad-leaved forest edge, upper to mid slope	20.8

Scientific results of the project (continuation)

Population vitality estimates

Population vitality estimates were obtained for all four surveyed populations of *Daphne sophia* in Ukraine. We have found that Malaya Volchaya population has significantly higher vitality estimates comparing with other populations, Okhrimivka, Vtoroye Zhovtnevoye and Kolodeznoye populations. The share of low vigour individuals in Malaya Volchaya population is 8,24%, while in Okhrimivka, Vtoroye Zhovtnevoye and Kolodeznoye populations it amounts to 40,91, 34,00 and 39,44%, accordingly (all differences are significant; Mann-Whitney U-test, U=652, U=1620, U=2139, $p < 0,01$, accordingly). There are no significant differences in vitality estimates between Okhrimivka, Vtoroye Zhovtnevoye and Kolodeznoye populations (Mann-Whitney U-test). The higher vitality of Malaya Volchaya population is obviously related to higher proportion of young individuals of clonal origin (80% comparing to 68,18, 70,00 and 32,39% in other populations). This finding is supported by measurements of overall height of individual plants. The mean height in Malaya Volchaya population is 233 mm, while it totals 560, 564 and 467 mm in others. The

Kolodeznoye population is distinct among all surveyed populations by high impact of parasitic fungi and insects. Numerous damage signs (leaf mottling and discolouration, shoot dieback etc.) were found in contrast to any other population. Okhrimivka population seems to be the most threatened because of very small area occupied, lowest vitality estimates and lowest density (5,5 individuals per 1 m^2). Nevertheless, some most vigorous individuals (total height slightly more than 1,5 m) were found just in this population.

The mean vitality was estimated also for *Hedysarum ucrainicum* populations. Overall estimates were averaged and compared for Sharovka and Novo-Belaya populations. The portion of low vigour individuals is almost two times higher in Novo-Belaya population (20,88%) as compared to Sharovka population (11,8%; differences are significant, Mann-Whitney U-test, U=64646; $p < 0,05$). In general, plants in Sharovka population are of significantly lower height but have higher number of longer inflorescences. The number of inflorescences per individual and overall inflorescence height seems to be very useful indices for the assessment of vitality of *Hedysarum ucrainicum* populations.

Scientific results of the project (continuation)

Factors of threat and conservation priorities for Daphne sophia and Hedysarum ucrainicum populations in Ukraine

Main factors of threat for *Daphne sophia* populations are afforestation of chalk slopes, inappropriate forestry measures and forest & steppe fires. Among these factors afforestation and forestry measures are the most dangerous being accompanied by terracing of slopes with complete destruction of vegetation cover and by silvicultural measures including soil treatment. Afforestation obviously was the only factor resulted in extinction of two local populations of the species in Volchaya river valley in XX century. *Daphne sophia* should be very vulnerable for any disturbance due to extremely small areas occupied by each remaining population. *Hedysarum ucrainicum* is much less vulnerable owing to its dominant positions in the structure of chalk plant communities but nevertheless the range of the species is rather restricted. The threat of afforestation is also important for *Hedysarum ucrainicum* but much lesser comparing to *Daphne sophia* case. The conservation priorities for each population of both species are summarised in Table 2.

The protection status for all surveyed sites is inappropriate. In Belaya river valley *Hedysarum ucrainicum* sites have local protection status (so called “nature monuments”). The only well known site of Daphne sophia (found in 1978) is within Siverskodonetsky local landscape “zakaznik” (small nature reserve; created in 2001). But it was missed or ignored (?) when Volchansky national botanical “zakaznik” (small nature reserve) was created in 1994 to protect rare chalk plant communities in the district. In both cases there is no special protection regime or monitoring of the state of populations of rare species. Therefore, the problem of assignment of higher legal protection status remains urgent for all surveyed sites. The conclusions on conservation needs for focus species were reported to Kharkiv and Lugansk regional offices of the Ukrainian Ministry for Environmental Protection.

The general success of field expedition work opened the door to thought-out education actions in local schools planned as a second part of Daphne'04 project activities.

Scientific results of the project (continuation)

Table 2. Factors of threat and conservation priorities for the populations of Daphne sophia and Hedysarum ucrainicum in Ukraine.

Population	Factors of threat/ intensity	Conservation priorities/ importance
	Daphne sophia	
№ 1 (Okhrimivka)	Inappropriate forestry measures/ high Forest fires/ high	Monitoring of the population state/ high Enhancing protection status of the area/ high Control of forestry measures/ high Educational work among local people especially among workers of Chaikivka (formerly, Okhrimivka) forestry enterprise/ high
№ 2 (Malaya Volchaya)	Afforestation/ medium Steppe fires/ medium Run-off of fertilisers and pesticides from agricultural fields/ medium	Monitoring of the population state/ high Assigning protection status to the area/ high Control of regional afforestation projects/ high Educational campaign among local people including farmers/ high
№ 3 (Vtoroye Zhovtnevoye)	Inappropriate forestry measures/ low Steppe fires/ low Grazing/ low	Monitoring of the population state/ high Assigning protection status to the area/ high Educational campaign among local people especially farmers/ high
№ 4 (Kolodeznoye)	Diseases & parasites impact/ high Inappropriate forestry measures/ low Forest and steppe fires/ low	Monitoring of the population state/ high Assigning protection status to the area/ high Educational campaign among local people/ high Identifying pathogens/ medium
	Hedysarum ucrainicum	
№ 1 (Sharovka)	Afforestation/ medium	Monitoring of the population state/ high Assigning protection status to the area/ high Control of afforestation projects/ high Educational campaign among local people/ high
№ 2 (Novaya Belaya)	Afforestation/ low Run-off of fertilisers and pesticides from agricultural fields/ low	Monitoring of the population state/ high Enhancing protection status of the area/ high Educational campaign among local people especially farmers/ high
№ 3 (Pavlenkovo)	Afforestation/ low Run-off of fertilisers and pesticides from agricultural fields/ low	Monitoring of the population state/ high Enhancing protection status of the area/ high Educational campaign among local people especially farmers/ high

The educational campaign

The data of Daphne'04 project expeditions were used to prepare two types of posters (A0 format). Each poster is focused either on *Daphne sophia* or on *Hedysarum ucrainicum* and was designed to be used in schools in Kharkiv region (*Daphne sophia* range) or in Lugansk region (*Hedysarum ucrainicum* range). The need to prepare region-specific educational information is in huge differences in the composition of chalk plant communities in both regions. We use impressive findings of the expedition work to create a core of the poster with information on focus species accompanied by the data on typical or rare/endangered plant species of chalk outcrops, which can be found virtually in a school backyard. We described the most distinct traits of the species in popular form and stressed why it's so important to save these unique plants for the future. All posters are illustrated by photos taken in Daggel'04 expedition work. The posters were installed on information boards in biology classrooms in 6 schools in Volchansk district, Kharkiv region and in 5 schools in Novopskov district, Lugansk region. Despite posters we have supplied most concerned teachers by large-format photos of plants suitable for use for educational purposes.

In both focus regions we have organised a lecture/talk at one school. We made our choice for such undertaking if there is an environmental study group of children led by teacher of biology in the school already. We narrated pupils about true discoveries that can be done not in overseas countries but in their native lands, near their homes, where nature still keeps its secrets untouched. The discoveries of two previously unknown localities of *Daphne sophia* made by our team were used as an example. We stressed the fragility of landscapes and ecosystems around and explained what should be done to save one of the rarest European plant species they live nearby.

Two excursions were organised for most

active pupils to chalk slope habitats with a visit to newly discovered site supporting small population of *Daphne sophia*. We tried to show the typical characters of river valley landscapes including *Daphne sophia* habitats in upper parts of slopes and explain the history of chalk outcrops in the region. We notice all encountered rare plant species of chalk outcrop communities as well as bird and mammal species (e.g. numerous marmots). Local teachers of biology who participated in the excursions reported that it was very useful for improving their skills in chalk plant species identification and in raising the knowledge in plant ecology.

The results of the Daphne'04 project were stated in special information sheets used to report to regional and international communities of botanists and conservationists. We have tried to summarise in concise form all major findings of the project with lessons learnt including considerations on the causes of *Daphne sophia* rarity & vulnerability and prospects for the future research and conservation actions for both focus species. The target groups for international reporting were international plant conservation organisations, some journals (e.g. Plant Talk) and specialists on other Daphne species. The target groups for regional distribution of the project findings were state bodies for nature protection, regional forestry management offices, regional branches of Ukrainian Botanical Society, regional environmental NGOs. Main scientific results are also prepared for publication as scientific papers in international and Ukrainian journals.

The problems encountered and the solutions adopted

The problems encountered in the course of the project implementation were mainly related to *Daphne sophia* searches. The searches are most easy when the majority of plants is in blossoming condition (mid to late May). Before and after this period the searches are very difficult taking into account extremely small area occupied by separate *Daphne sophia* populations versus great areas of suitable habitats to be checked, dense vegetation in forest edge zone and in bush thickets and so on. As the area to be covered by expedition searches was vast, it wasn't possible to time expeditions to flowering period only. We need to elaborate some guidelines for search technique in post-blossoming time. This was done by identifying *Daphne sophia* habitat preferences and devoting much attention to those slopes of right banks in river valleys, which meet set criteria (they must be very steep and of certain profile type, have signs of presence of natural forest or bushy vegetation). The correction of search technique was productive as two newly discovered *Daphne sophia* populations were found in post-blossoming time following search criteria for habitat structure.

Another difficulty was in identifying individuals in *Daphne sophia* for vigour estimates. The problem is in separating

clones from the older plant they are probably generated from (how to treat them: as separate individuals or as parts of one complex individual). In any case we have regarded stems as parts of one individual only if there are visible signs of fork above ground level.

In educational campaign we have faced a usual problem in that pupils are much more interested in animals than in plants. To attract the attention of children to plants (namely to *Daphne sophia* and *Hedysarum ucrainicum*) we designed our lecture as a story about true adventures into enigmatic and ancient world of chalk “mountains”. All distinct traits of *Daphne sophia* were used for shaping its image including antiquity (“of mammoth age”), rarity, poisonousness, flower beauty and so on.

One unexpected difficulty was a need in special permission to work in frontier area that is new demand for scientific research issued by Ukrainian Frontier Service. Team staff successfully resolved the problem in time before main expedition period in June-July 2004.

The absence of detailed maps both printed and digitised (1: 10 000, 1: 25 000, 1: 50 000 scale; all are classified as secret by state bodies to the date) is a serious and unresolved obstacle. It hindered adequate presentation of the data on the range fragments of *Daphne sophia*, which are rather small to be depicted on available maps.

Financial report

Budget items	Item details and estimated costs, UAH		Expended		Requested, £
			UAH	£ *)	
Equipment	Notebook		4200	525	500
Medical kits	Fist-aid outfit (2 set x 120 UAH)		240	30	50
Travel expenses	Car rent	6 expedition trips 45 days in total Two cross-country vehicle (UAZ 469 and VAZ 2121 Niva) 2 car x 120 UAH per day x 45 days	10800	1350	1200
	Fuel	Petrol A-76 (for UAZ 469): 320 litres x 2.00 UAH = 640 UAH Petrol AI-95 (for VAZ 2121 Niva): 250 litres x 2.70 UAH = 675 UAH	1315	165	150
	Daily allowance	32 UAH per person/day x 7 persons x 45 days	10080	1260	1120
Supplies	Digital maps (Kharkov and Lugansk region, 2 x 400 UAH)		0	0	150
	Stationery (50 UAH) Films (25 x 12 UAH = 300 UAH) Printing photos for planned lectures (165 UAH) Production of posters (15 x 75 UAH = 1125 UAH)		1640	205	150
	Batteries for GPS receivers (5 UAH x 16)		80	10	25
Post-project	Production of report (200 UAH) Production of information sheets (100 x 14 UAH = 1400 UAH)		1600	200	250
	Mail expenses		200	25	75
Contingency	Expenses for excursions organisation (minibus rent, food)		800	100	200
TOTAL				3870	3870

*) Rate of exchange: 1£ = 8 UAH

The project prospects

The implementation of Daphne'04 project raised a set of questions about *Daphne sophia* ecology and conservation strategy for the species. *Daphne sophia* shows high disposition to cloning, and despite heavy blooming absolutely no berries were found later in summer in 2004. Such findings impel to investigate thoroughly if cloning really is now the only way for *Daphne sophia* regeneration and spreading. We have found some small beetles (probably, pollen beetles) in flowers but if these can be pollinators (as e.g. in *Daphne laureola* in Spain; Alonso, 2004) remained unknown. Moreover, the studies of parasite insect and fungi species should be very promising (such species were found on *Daphne sophia* leaves and stems in the course of the project). It's not impossible to discover even some new, undescribed species taking into account extreme rarity of host plant! So, it seems very fruitful to investigate in detail the relations of *Daphne sophia* with pollinators, defoliators, parasites and species that may disperse the seeds. Such research can help to answer important questions e.g. how can we account for ecological relations of *Daphne sophia* with other species in setting conservation strategy and if the absence (or extinction?) of potential pollinators/ seed dispersers really poses a great threat for *Daphne sophia* survival.

Another very interesting question is about the time of divergence of different *Daphne sophia* populations (e.g. to be estimated with use of mtDNA markers). This is a right way for solution of enigmatic question about the time of origin of chalk pine forests in Middle Russian Plain region, an almost disappeared ancient ecosystem. Such research can be linked to the survey of all remaining *Daphne sophia* populations in adjacent regions in Russia. Despite targeting major scientific task it's an absolutely necessary step to identify current status of the species within the whole range, set up overall conservation strategy and harmonise protection measures to be taken in both countries.

Hedysarum ucrainicum case poses a challenge both for evolutionary biologists and plant conservationists. Why the range of the species is so small and restricted? Why the species is so abundant in spite of small range? Why this legume plant inhabits some river valleys but is absent in others even within its range? To solve these questions we need carefully planned investigation of geological and landscape conditions within the range, habitat preferences of the species and so on.

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who helped us in finding one of previously known *Daphne sophia* populations. It's worse to note the contribution of Vladimir Skorobogatov, librarian at Central Scientific Library of Kharkiv national university, who provided access to extremely important, old literature sources on *Daphne sophia*.

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Appendix A.

The area covered by Daphne'04 project expeditions to search remaining *Daphne sophia* (1) and *Hedysarum ucrainicum* populations in Ukraine in 2004 year.

Appendix B.

The current range of *Daphne sophia* in Ukraine.
White points *Daphne sophia* populations which became extinct to the end of XX century.
Yellow points *Daphne sophia* populations re-discovered by Daphne'04 project team for the first time since 1910 and 1978 years.
Blue points *Daphne sophia* populations discovered by Daphne'04 project team in 2004 year.

Appendix C.

The current range of *Hedysarum ucrainicum* in Ukraine as revealed by Daphne'04 project expeditions in 2004 year (yellow areas indicate separate populations).